

WEARABLE ELECTRONIC DEVICE

TECHNICAL FIELD

[0001] The present invention generally relates to wearable electronic devices.

BACKGROUND ART

[0002] Electronic devices can be made of elastic, flexible or bendable material thereby enabling production of wearable electronic devices such as a wrist band or a chest band.

SUMMARY

[0003] According to a first example aspect of the invention there is provided an apparatus comprising an elongated apparatus structure configured to fit around a body part of a user; an actuator configured to change shape of the elongated apparatus structure;

wherein the actuator is configured to change tightness of the elongated apparatus structure around the body part of the user based on an action the apparatus is performing.

[0004] According to a second example aspect of the invention there is provided a method comprising controlling an apparatus comprising an elongated apparatus structure configured to fit around a body part of a user and an actuator configured to change shape of the elongated apparatus structure; and

controlling the actuator to change tightness of the elongated apparatus structure around the body part of the user based on an action the apparatus is performing.

[0005] In an example implementation there is provided a computer program product comprising computer code for causing performing the method of any example aspect of the invention, when executed by an apparatus.

[0006] In an example implementation there is provided a non-transitory memory medium comprising computer code for causing performing the method of any example aspect of the invention, when executed by an apparatus.

[0007] Different non-binding example aspects and embodiments of the present invention have been illustrated in the foregoing. The above embodiments are used merely to explain selected aspects or steps that may be utilized in implementations of the present invention. Some embodiments may be presented only with reference to certain example aspects of the invention. It should be appreciated that corresponding embodiments may apply to other example aspects as well.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention will be described, by way of example only, with reference to the accompanying drawings, in which:

[0009] FIG. 1 shows a schematic view of an apparatus according to an example embodiment of the invention;

[0010] FIG. 2 shows a schematic view of an apparatus according to an example embodiment of the invention in a bent position;

[0011] FIG. 3 shows a schematic view of an apparatus according to an example embodiment of the invention in a loosened position;

[0012] FIG. 4 shows a schematic view of an apparatus according to an example embodiment of the invention in a tightened position;

[0013] FIG. 5A shows a schematic view of an apparatus according to an example embodiment of the invention;

[0014] FIG. 5B shows a schematic view of an apparatus according to an example embodiment of the invention;

[0015] FIG. 5C shows a schematic view of an apparatus according to an example embodiment of the invention;

[0016] FIG. 6 shows a schematic block diagram of an apparatus according to an example embodiment of the invention;

[0017] FIG. 7 shows a flow diagram illustrating a method according to an example embodiment of the invention;

[0018] FIG. 8 shows a flow diagram illustrating a method according to an example embodiment of the invention; and

[0019] FIG. 9 shows a flow diagram illustrating a method according to an example embodiment of the invention.

DETAILED DESCRIPTION

[0020] Some example embodiments of the present invention and potential advantages are understood by referring to FIGS. 1 through 9 of the drawings.

[0021] According to an example embodiment there is provided shaping and/or tightening of a wearable device with an actuator. The wearable device is for example a wrist band, a chest band, an ankle band or some other device comprising an elongated apparatus structure (e.g. a strap or a band) configured to fit around a body part or body extension of a user. The elongated apparatus structure is made of a suitable elastic, stretchable, flexible or bendable material (such as plastic, textile, or sheet metal), for example. Alternatively the elongated apparatus structure can be made of several strict or tough non-bendable parts (made of plastic, metal, or glass for example) that are linked to each other with a mechanical hinge or flexible/stretchable material to form the elongated structure. The actuator can be used for example for bending the elongated apparatus structure into a circular, oval, elliptical or the like form suited for being fitted around a body part or body extension of a user. It is to be noted that there may be one actuator or a plurality of actuators.

[0022] In an embodiment the actuator is configured to change tightness of the elongated apparatus structure around the body part of the user based on an action that is being performed by the wearable device or by a physically separate device or apparatus part that communicates with the wearable device over a communication connection. In an example, the shape of the elongated apparatus structure is changed automatically without specific user input or user action.

[0023] In an example embodiment the actuator is configured to change the shape of the elongated apparatus structure linearly so that any shape is available. In an alternative the actuator is configured to provide a stepwise shape change so that for example three different shapes or positions are provided. In an example embodiment there are an unbent position and two bent positions. In an example embodiment there are an unbent position, a loose fitting position and a tight fitting position. These examples are discussed in more detail in connection with FIGS. 1-4.

[0024] The method that is used for controlling the actuator depends on what type actuator is used. In an embodiment an actuator made of a shape memory alloy is used. In this case the shape change can be linear. The shape change is provided by changing current or voltage used for controlling the actuator and the shape depends on the current or voltage level. Alternatively there may be a locking mechanism that locks the apparatus structure to desired shape/shapes.

[0025] In this solution power needs to be used only for driving the apparatus structure to the desired shape and there-